Question 1. *Show that it is possible to have a sequence* (x_n) *diverge while the sequence* $(|x_n|)$ *converges.*

Solution. Consider $x_n = (-1)^n$. Then (x_n) diverges, because there are two subsequences $x_{2n} = 1$ and $x_{2n-1} = -1$, which have different limits (1 and -1, respectively). But $|x_n| = 1$ for all n, so $(|x_n|)$ obviously converges to 1. $\square$